

ABSTRACT OF THE INVENTION

A released beam structure fabricated in trench and manufacturing method thereof are provided herein. One embodiment of a released beam structure according to the present invention comprises a semiconductor substrate, a trench, a first conducting layer, and a beam. The trench extends into the semiconductor substrate and has walls. The first conducting layer is positioned over the walls of the trench at selected locations. The beam is positioned with the trench and is connected at a first portion thereof to the semiconductor substrate and movable at a second portion thereof. The second portion of the beam is spaced from the walls of the trench by a selected distance. Therefore, the second portion of the beam is free to move in a plane that is perpendicular or parallel to the surface of the substrate, and could be deflected to electrically contact with the walls of the trench in response to a predetermined acceleration force or a predetermined temperature variation applied on the beam structure. Other beam structures such as a beam held at both ends, or a beam held in the middle are also possible. Several beam structures at different angles can be fabricated simultaneously and mechanical etching stops are automatically formed to prevent unwanted overstress conditions when manufacturing several beam structures at the same time. Beam structures can also be manufactured in three orthogonal directions, providing information on acceleration in any direction.